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REVIEW OF STATE MINE INSPECTOR'S REPORTS AS THEY RELATE TO ACCIDENTS FROM FALLS OF ROOF

BY

J. W. PAUL

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REVIEW OF STATE MINE INSPECTORS' REPORTS AS THEY RELATE TO ACCIDENTS FROM FALLS OF ROOF [1]

By J. W. Paul[2]

A review of the published reports of the Mine Inspection Service of 19 States has been made to ascertain the character of the data relating to accidents from falls of roof and sides, to determine how the data will be helpful in a study of the problem, and to suggest methods for the prevention of such accidents. These 19 States produced 93 per cent of all of the coal in the United States during 1927, and falls of roof or sides in the mines of these States killed 1,067 men, a number equal to 54 per cent of all underground fatalities.

Mining officials and students interested in a study of the circumstances under which persons are killed by accidents in mining naturally look to official publications to supply the data needed for their analysis and for suggestions that may be helpful in outlining a campaign to curtail or prevent the occurrence of accidents from the major or dominating cause. Without a knowledge of the circumstances under which accidents occur, there can be no systematic or organized effort to combat the hazards that are responsible; but with a knowledge of the circumstances and conditions responsible for any class of accidents there should evolve a practical scheme for their elimination or curtailment.

The dissimilarity of the forms in which the reports are presented is most striking, as there is a lack of uniformity in many of the essential features relating to important data on accidents. However, many of the published reports, embody features which might be taken as models.

The main function of an Inspection Service report should be to give information concerning conditions affecting the efficiency of the service in protecting workmen against death or injury; this appears to be the primary purpose for which the service was created by the State.

This résumé of the State reports is not made in a spirit of criticism, but in the hope that future reports may be improved; reports should be presented with a degree of uniformity that will increase their value in a study of the circumstances and conditions contributing to accidents from falls of roof.

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[2] Senior mining engineer, U. S. Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.

The fatality accidents underground for any one year occur in mines which produce practically half the nation's coal, and in the mines producing the remainder of the coal tonnage for the same period there are no fatalities. This condition prevails year after year, but the mines that are free of fatalities during one year may join the group having fatalities during the next year. The list of mines that make up these two groups is constantly changing.

The reports reviewed are not all for the same period; owing to the lateness of their appearance, it was necessary to go back as far as 1919 for one of them. The general outline of the reports from any given State for one year is similar to previous and subsequent issues; therefore, the reports that were selected were typical of previous issues.

SUMMARY OF REPORTS TABULATED

Table 1 is a summary and comparison of State inspectors reports as they relate to accidents from falls of roof and coal. It also indicates those that are deficient in data either in tabular form or in the text. It is believed that the information called for by the headings of this table when compiled for each State would be a great aid in analyzing the primary and ultimate cause of accidents from falls, and also in devising methods for the prevention of such accidents.

SPECIAL STATEMENT IN TEXT

Most reports begin with an introduction to and summary of the contents; and as the prevention of accidents is the main reason for issuing the State mine inspector's reports, it would be natural to expect to find a discussion of the accidents in the main text. However, of the 20 reports, covering 19 States, 14 make no special mention of the accidents.

REMEDIES PROPOSED

One report presents a brief discussion of a proposed remedy for all accidents which will place the responsibility definitely for each accident. In none of the other 19 reports are any proposed remedies discussed.

DETAILS OF ACCIDENTS

Details of fatal accidents, strangely, are given little prominence in many of the reports. Eleven reports give no details, and 9 reports give details of each fatality. Four reports do not give a tabular statement of accidents by causes.

WHERE ACCIDENTS OCCURRED

Seven reports give the place in the mine where the accident occurred; two others give this information only partly; 11 reports do not furnish this information.

Table 1 - Summary of State Mine Inspectors' Reports, Giving Data Relating to Accidents from Falls of Roof and Coal

State	Date of issue of report	Pages in the report	Period covered by report year ending	Lives lost by falls[1]	Percent of all inside fatalities[1]	Is tabular data on accidents given		Is a special statement given in the text?	Are any remedies proposed in the text?	Are details of each fatal accident given?	Is place in mine given where the accident occurred?	Is mention made of condition of place or nearness of timber?	Is mention made of time of last inspection by an official?	Is mention made of timber regulations being neglected?	
						Fatal	Non-fatal								
Arkansas	-	59	June 30, 1925	N.G.	N.G.	No	No	No	No	No	No	No	No	No	
Colorado	4/1/27	80	Dec. 31, 1926	26	N.G.	Yes 44	Yes 1,716	Yes	No	Yes	Yes	No	No	No	Of 1,716 injuries underground, 593 were due to falls.
Illinois	-	235	June 30, 1924	Yes 55	Yes 49.1	Yes 112	3,352	Yes	No	Yes	No	No	No	No	Of 3,352 injuries underground, 919 were due to falls.
Indiana	-	29	Sept. 30, 1925	N.G.	N.G.	Yes 101	N.G.	No	No	No	No	No	No	No	
Iowa	5/ /24	-	Dec. 31, 1923	Yes 11	Yes	Yes	Yes	No	No	No	Yes	No	No	No	
Kansas	3/5/26	145	Dec. 31, 1925	Yes 5	N.G.	Yes	Yes	No	No	Yes	Yes	No	No	No	
Kentucky	6/30/26	290	Dec. 31, 1925	Yes 102	Yes 54.4	Yes	No	Yes	No	No	No	No	No	No	
Maryland	-	84	Dec. 31, 1925	Yes 8	N.G.	Yes	Yes	Yes	No	Yes	Partly	In some cases	No	In some cases	
Montana	-	5	June 30, 1926	Yes 4	N.G.	No	No	No	No	No	At face	No	No	No	
New Mexico	-	124	Oct. 31, 1924	Yes 10	N.G.	No	No	No	No	Yes	No	No	No	No	
North Dakota	12/31/26	80	Oct. 31, 1926	None	-	Yes 1	Yes 215	No	No	Yes	Yes	-	No	-	One fatal injury, resulting from breaking of cable. Of 215 non-fatal injuries, 24 were from falls.
Ohio	9/1/25	116	1924 and 1925	Yes	N.G.	Yes	Yes	No	No	No	No	No	No	No	
Pennsylvania Anthracite	5/29/25	99	Dec. 31, 1921 and 1922 (2 years)	Yes 348	Yes 45.6	Yes	Yes	No	No	No	Yes	No	No	No	
Pennsylvania Bituminous	5/29/25	378	1921 and 1922 (2 years)	Yes 324	Yes 50.3	Yes	Yes	No	No	No	Yes	No	No	No	
Tennessee	-	135	Dec. 31, 1926	Yes 14	Yes 29	Yes	Yes	Yes	No	No	No	No	No	No	
Utah	-	-	2 years Dec. 31, 1926	Yes 33	Yes 76.6	No	No	No	No	Yes	No	No	No	No	
Virginia	-	6	Sept.30, 1926	Yes 36	Yes 73	Yes	Yes	No	No	No	No	No	No	No	
Washington	-	52	Dec. 31, 1919	Yes 5	Yes 35.7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
West Virginia [2]	-	324	Dec. 31, 1925	Yes 358	Yes 55.3	Yes	Yes	No	No	No	No	No	No	No	
Wyoming	-	45	Dec. 31, 1926	Yes 12	57.1	---	Yes	No	No	Yes	In some cases	No	No	No	

[1] N.G. = Not given.

[2] Period of 18 months.

CONDITION OF PLACE AND NEARNESS OF TIMBER

In a study of the probable cause of falls of roof it is always of prime importance to know the physical condition of the vicinity where the accident occurred and the position of any timber that had been placed for protection against such falls. In only two reports is this information given, and in one of them it is given only in part.

PRIOR INSPECTION BY AN OFFICIAL

Supervision (direction) and discipline probably constitute the main force behind a safety program for the prevention of accidents, so that when an accident does occur it is of much importance to determine wherein supervision or discipline may have been remiss. This involves ascertaining when the scene of the accident was last visited by an official prior to the occurrence of the accident, and the nature of any instructions that may have been given. None of the reports reviewed gives this information.

NEGLECT OF TIMBER REGULATIONS

Only one report mentions the condition of the timbering at the scene of fatal accidents by falls of the roof, but it does not give this information for all fatal accidents.

DISCUSSION

Much, if not all, of the information on fatal accidents from falls is believed to constitute a part of the office records of the State Mine Inspector. The incorporation of this data in the published reports may have been omitted either as economy in the cost of printing or on the assumption that the information is of value only to the inspection service. However, it is found that one report gives all but two of the main headings named above; another report gives all but three, whereas one report gives none.

SUGGESTED OUTLINE FOR REPORT

In the interest of uniformity or standardization of State reports the following outline is presented for consideration by those who have in charge the assembly and compilation for publication of data on accidents.

ACCIDENTS

1. Fatal, inside: Discussion by causes, number by each cause; ratio per million tons of product, ratio per thousand 300 shifts, ratio per 1,000 underground employees.

2. Fatal, outside: Same as for 1, inside.

3. Give tabulation by Bureau of Mines form. (See form A).

4. Nonfatal, inside: Discuss by causes and number by causes permanent total disability, permanent partial disability, temporary disability, giving nature of injury and total lost time.

PROPOSED REMEDIES, DISCUSSION OF

The data developed by the use of the special forms will enable such an analysis to be made as will admit of intelligent discussion of causes of accidents and suggest remedies which may lead to material reduction of accidents from falls. At least the use of such forms and the analysis of the data will indicate the point where it will be profitable to make an attack.

With the view of unifying and simplifying the presentation of the data on accidents, the 9 forms following have been prepared and are submitted for consideration by those who direct the preparation of publications on mine accidents.

FORM A

Coal mine fatalities from all causes

Cause of accident	No. killed	Per cent
UNDERGROUND		
Falls of roof (coal, rock, etc.):		
Ordinary disaster a		
Major disaster b		
Falls of face or pillar coal		
Mine cars and locomotives:		
Ordinary disaster		
Major disaster		
Explosions of gas or coal-dust:		
Ordinary disaster		
Major disaster		
Explosives:		
Ordinary disaster		
Major disaster		
Suffocation from mine gases:		
Ordinary disaster		
Major disaster		
Electricity		
Animals		
Mining machines		
Mine fires (burned, suffocated, etc.):		
Ordinary disaster		
Major disaster		
Other causes:		
Ordinary disaster		
Major disaster		
Total		
Ordinary disaster		
Major disaster		
SHAFT		
Falling down shafts or slopes		
Objects falling down shafts or slopes		
Cage, skip, or bucket:		
Ordinary disaster		
Major disaster		
Other causes		
Total		
Ordinary disaster		
Major disaster		

a An accident in which less than five were killed.

b An accident in which five or more were killed.

Coal mine fatalities from all causes - Continued

	No. killed	Per cent
SURFACE		
Mine cars and mine locomotives		
Electricity		
Machinery		
Boiler explosions or bursting steam pipes		
Railway cars and locomotives		
Other causes:		
Ordinary disaster		
Major disaster		
Total		
Ordinary disaster		
Major disaster		
Grand total		
Ordinary disaster		
Major disaster		

Total days mine was in operation during year shift of ____________ hours	
Surface employees	
Total employed underground and on surface	
Total days tipples operated during year shift of ____________ hours	

FORM B -

Occupation and nationality of persons employed underground and number killed and injured by falls

OCCUPATION UNDERGROUND	NATIONALITY														
	American			Italian									Totals		
	Total	Killed	Injured	Total	Killed	Injured	Total	Killed	Injured	Total	Killed	Injured	Total	Killed	Injured
Workers at the "face":															
Pick miners and pick loaders or laborers															
Machine runners, cutters, helpers, and scrapers															
Machine miners and loaders															
Operators of mechanical loaders, scrapers, or conveyors															
Shot firers and runners															
Fire bosses, mine examiners, fire examiners, gasmen															
Face bosses															
Haulage workers:															
Drivers and boss drivers															
Motormen															
Motormen's assistants, brakemen, trip riders, patcher switchmen, snappers, runners, gripmen															
Doorboys or trappers															
Cagers															
Spraggers, car-couplers, switch tenders, greasers															
Others underground:															
Mine foremen, managers, and pit bosses															
Assistant foreman, managers, pit bosses															
Stablemen															
Trackmen, roadmen, tracklayers															
Pumpmen, pipemen, and helpers															
Timbermen, bratticemen, rockmen, and helpers															
Wiremen, electricians, and helpers															
Hoistmen (stationary engineers)															
All others															
TOTALS															

FORM C

Place in mine where fatal accident occurred from falls of roof

Location	No. killed
In room at or near face	
In room along haulage track	
In room at or near its entrance	
In entry at or near face	
In entry along haulage road	
In pillar work	
In other locations	

FORM D

Occupation of person at the time of fatal accident from falls of roof

Occupation	
Loading coal	
Undercutting coal	
Setting timber	
Removing timber	
Preparing shot	
Laying track	
Testing roof	
Taking down loose roof	
Traveling to or from working place	
Returning after blasting	

FORM E

Conditions of working places where fatal accidents occurred from falls of roof or sides

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No. of persons killed working alone

No. of persons killed working with another person

No. of persons killed working in narrow place, 9 to 14 feet ....

No. of persons killed working in wide places, 15 to 20 feet ....

No. of persons killed working in wide places, 20 to 30 feet ....

No. of persons killed working in longwall face ....

No. of persons killed extracting pillars ....

No. killed where timber was within 3 feet of face ....

No. killed where timber was within 4 feet of face ....

No. killed where timber was within 5 feet of face ....

No. killed where timber was within 6 feet of face ....

No. killed where timber was within 8 feet of face ....

No. killed where timber was within 10 feet of face ....

No. killed where timber was within 12 feet of face ....

No. killed where timber was over 12 feet of face ....

No. killed where no timber was used ....

Total ....

FORM F

Data on timbering where fatal accidents occurred from falls of roof

Number of persons killed where no regular system of timbering was observed ------------------------

Number killed where there was a regular system of timbering ------------------------------------

Number killed through neglect in complying with system of timbering ----------------------------------

FORM G

Hour of day at which fatal accidents occurred from falls of roof

A.M.	No. killed	Percentage of grand total	P.M.	No. killed	Percentage of grand total
Midnight to 6 A.M.			12:01 to 1		
6:01 to 7			1:01 to 2		
7:01 to 8			2:01 to 3		
8:01 to 9			3:01 to 4		
9:01 to 10			4:01 to 5		
10:01 to 11			5:01 to 6		
11:01 to 12			6:01 to midnight		
			Total		100.0

FORM H

Number of lives lost by falls of roof or sides with respect to the interval elapsing between occurrence of accident and time when the place was visited by an official

Interval between official visit and accident	No. killed
During interval of less than 30 minutes	
During interval over 30 minutes and less than 1 hour	
During interval over 1 hour and less than 2 hours	
During interval over 2 hours	
During interval of unknown duration	
Total killed by falls	

FORM I

Underground experience of persons killed by falls of roof

Length of experience in coal mines	No. killed
Less than 30 days	
From 30 to 60 days	
Over 2 months, less than 4 months	
Over 4 months, less than 6 months	
Over 6 months, less than 8 months	
Over 8 months, less than 10 months	
Over 10 months, less than 1 year	
Over 1 year, less than 2 years	
Over 2 years, less than 3 years	
Over 3 years, less than 4 years	
Over 4 years, less than 5 years	
Over 5 years, less than 6 years	
Between 6 and 10 years	
Between 10 and 15 years	
Between 15 and 20 years	
Between 20 and 25 years	
Over 25 years	
Unknown	
Total	